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Axion Like Particles in cosmos and astroparticle Physics

Abstract

Nowadays, there are no direct evidences of the existence of Axions and Axion-Like Particles (ALPs). However, ALPs can manifest their existence indirectly in astrophysical and cosmological environments. ALPs have been supposed to be the principal component of the Dark Matter. But other astrophysical evidences are possible. Very light ALPs can be produced in stars due to the coupling with SM particles and would therefore alter the stellar evolution.

In addition, above a certain energy any gamma ray flux emitted by an extragalactic source should be attenuated by the process $\gamma + \gamma(\text{bgk}) \rightarrow e^+ e^-$ pair production, but if photons are partly converted into ALPs which travel to our galaxy where they are converted back to photons by the galactic magnetic field. We discuss also other cosmological applications.

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